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Water Distribution Monitoring Panel sc

System Manual

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Section 1 Specifications

Specifications are subject to change without notice.

Panel	
Dimensions (H x W x D)	129.5 x 55.88 x 53.1 cm (51 x 22 x 20.9 in.)
Mounting options	Wall or rack
Operating temperature	5 to 40 °C (41 to 104 °F)
Storage temperature	–20 to +60 °C (–4 to 140 °F)
Humidity	90%, at 40 °C (104 °F) maximum
Wetted materials	See section 1.1, Wetted materials and components on page 6.
Weight	29.5 kg (65 lb)
Sample requirements	
Sample inlet	½-in. OD tube connection
Sample flow	0.4 to 0.6 L/min
Sample pressure	20 to 125 PSI
Sample temperature	5 to 40 °C (41 to 104 °F)
Waste/drain	¾-in. ID hose barb connection
Waste/drain pressure	Ambient, free flowing (atmospheric)
Electrical requirements	
Line voltage	100–115V/230V, 50/60 Hz
Installation category	II
Power consumption	90 VA maximum for CL17
	24W maximum for all other electronics
Digital output	RS485 Modbus
Enclosure	
Optional enclosure	NEMA 4X
Individual instrument specifications	
Specifications for individual instruments are presented in the manual supplied with the instrument.	

1.1 Wetted materials and components

CL17 Free Chlorine	
Fittings	Acetal Polypropylene PVC Polycarbonate Tefzel Santoprene ABS
Colorimeter	PVC Nitrile Glass
Tubing	Tygon R-3603 C-Flex
1720E Turbidity	
Body	Polystyrene
Bottom plate	Polycarbonate
Bottom plate, filter glass	Acrylic
Photo diode arm	Brass, marine grade
Screw, diode/drain plug	Stainless steel
Diode window	Quartz glass
Sample/drain fittings	Polypropylene
Drain plug seal	Buna-N
Conductivity Sensor	
	Polypropylene, stainless steel, CPVC
pH Controller/Sensor	
	Ryton, glass, Teflon, Viton, CPVC
Gems Pressure Sensor	
	17–4 pH, stainless steel
Other components	
	PVC CPVC Polypropylene PTFE pipe tape EDPM 304 stainless steel

Section 2 General information

2.1 Safety information

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

To ensure that the protection provided by this equipment is not impaired, do not use or install this equipment in any manner other than that specified in this manual.

2.1.1 Use of hazard information

DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION
Indicates a potentially hazardous situation that may result in minor or moderate injury.

Important Note: *Information that requires special emphasis.*

Note: *Information that supplements points in the main text.*

2.1.2 Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol, if noted on the instrument, will be included with a danger or caution statement in the manual.

	This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.
	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems after 12 August of 2005. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user. ***Note:*** *For return for recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment, producer-supplied electrical accessories, and all auxiliary items for proper disposal.*
	This symbol, when noted on a product enclosure or barrier, indicates that a risk of electrical shock and/or electrocution exists.
	This symbol, if noted on the product, indicates the need for protective eye wear.
	This symbol, when noted on the product, identifies the location of the connection for Protective Earth (ground).
	This symbol, when noted on the product, identifies the location of a fuse or current limiting device.
	This symbol indicates a laser device is used in the equipment.
	This symbol, when noted on the product, indicates elevated, potentially dangerous, levels of non-ionizing radiation

	This symbol, when noted on the product, identifies a risk of chemical harm and indicates that only individuals qualified and trained to work with chemicals should handle chemicals or perform maintenance on chemical delivery systems associated with the equipment.
	This symbol, when noted on the product, identifies the presence of a strong corrosive or other hazardous substance and a risk of chemical harm. Only individuals qualified and trained to work with chemicals should handle chemicals or perform maintenance on chemical delivery systems associated with the equipment.
	This symbol, when noted on the product, indicated that the marked item can be hot and should not be touched without care.
	This symbol, when noted on the product, indicated the presence of devices sensitive to Electro-static Discharge (ESD) and indicated that care must be taken to prevent damage with the equipment.

2.2 General product information

The Water Distribution Monitoring Panel sc (WDMP sc) is designed to combine established instrumentation into a pre-configured system for water monitoring. The WDMP sc provides continuous surveillance of drinking water distribution systems. The panel monitors multiple “indicator” parameters (chlorine, conductivity, pH, turbidity, pressure and temperature) that can signal changes in the water quality profile. The sc1000 controller (sold separately) collects data and interfaces with probes for setup and calibration.

The detection of a change in water quality is needed for two reasons. First, to help identify the presence of unintentionally or intentionally introduced contaminants and second, to meet distribution monitoring requirements in various federal and state EPA rules. On-line monitoring of the distribution system can help meet requirements for:

- Surface Water Treatment Rule by detecting disinfectant residual in the distribution system
- Disinfectants and Disinfection By-Products Rule

The panel is shipped with all instruments mounted, plumbed, and wired. One single sample manifold supplies all instruments with the sample for analysis from a ½-inch waterline tap. A single drain manifold collects discharge from all analytical instruments. The panel includes an in-line pressure sensor to detect a sudden change in pressure or sample loss.

The panels are assembled in an ISO 9001 certified manufacturing facility. All instruments are factory-calibrated to ensure accuracy.

Extended warranties are available with routine maintenance checks, operator training, scheduled parts replacements, and on-site start up services. Discounts are available on non-maintenance parts replaced during a scheduled visit.

2.3 Operating principle

Overview
A pre-set flow regulator controls the water flow through a single sample port into the panel. A single water line conducts sample to the sensors and instruments. Sample water is discharged through a common drain after analysis. A shut-off valve at the input stops flow during service and calibration. Output signals are Modbus RS485 format.

Functional components

- High voltage AC to low voltage DC power supply
  - Fuses
  - Surge suppressor
  - Line filter
  - AC/DC power supply
- Junction box with 2 Gateway boards and connectors for the sensor and output signals
- Sensors
  - CL17 plus Gateway board
  - Gems pressure sensor
  - 1720E turbidity sensor head
  - Digital pHD pH sensor
  - Digital conductivity sensor
  - Digital pHD ORP sensor (optional)
  - Digital chlorine sensor (when available, optional)

All components are mounted on a single, pre-plumbed panel that can be wall or rack mounted (see Specifications on page 5).

A power supply, housed in the junction box enclosure, provides power to the turbidimeter, Gems sensor, and the associated Gateway boards.

Temperature measurements are taken from the conductivity probe. Due to the placement of the this probe, the temperature measurement is fast and accurate. The Gateway boards convert the 4–20 mA signal from the CL17 and Gems pressure sensor to an RS485 Modbus signal. All other sensors produce Modbus signals directly. The Gateway boards are plugged into a PC board in a junction box enclosure. The junction box also contains circuitry that connects RS485 signals together for common presentation to an sc1000. The junction box is protected by a molded cover/tray that can be removed for use as a ‘table’ to hold beakers of calibration solutions. The molded junction box cover/tray is placed on two arms that rotate up from the panel to accept the cover/tray.

The hydraulic section splits off flows to different elements. After the flow regulator, flow is directed to a 1720E turbidity sensor, a CL17 chlorine analyzer, and vertical manifold which acts as a constant head device. The manifold is a cylinder with a tube down the center. Three sensors can mount into the wall of the cylinder. Incoming water rises in the cylinder until it reaches the top of the center tube. The top of the tube is open, allowing water to overflow down the center tube to the drain.

The manifold has a sample port to provide fluid to a separate TOC analyzer.

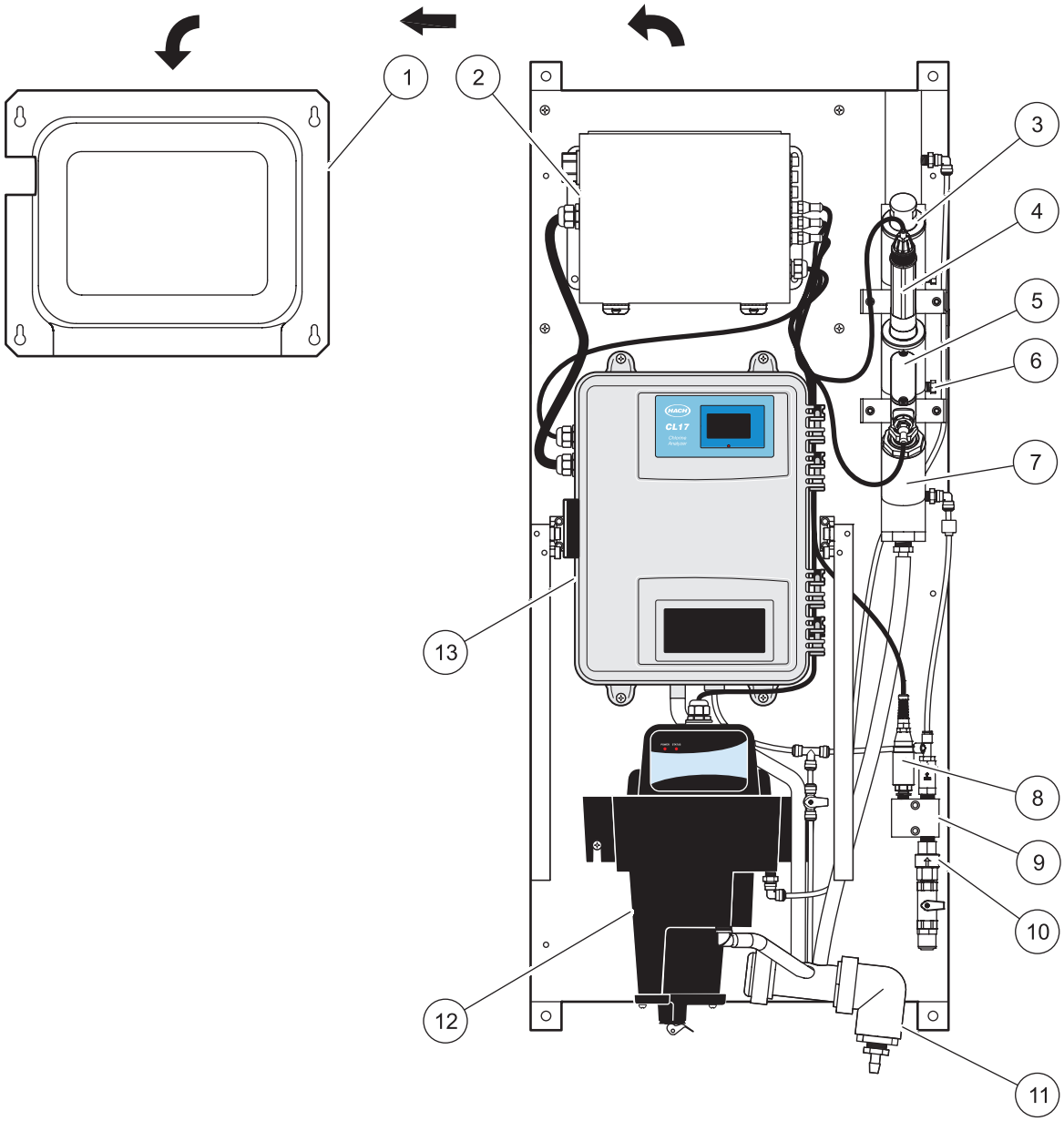


Figure 1 Panel overview

1	Removable cover/tray	**6**	Tap for TOC analyzer	**11**	Drain manifold
2	Power/signal junction box	**7**	Sample manifold	**12**	1720E
3	Port for additional sensor	**8**	Gems pressure sensor	**13**	CL17
4	Digital pH sensor	**9**	Tap for sampler		
5	Digital conductivity sensor	**10**	Check valve		

2.4 Unpacking

The WDMP sc system includes the following items wired, plumbed and mounted on a 22-inch wide by 48-inch high panel:

- Hach CL17 Chlorine Analyzer
- Hach 1720E Low Range Turbidimeter
- Hach /GLI pH Sensor
- Hach /GLI Conductivity Sensor
- Gems Pressure Sensor

Included Accessories:

- Binder with manuals for each instrument
- Start-up kit for the CL17 (includes maintenance kit, Torx wrench, Stir bar, pressure plate, two thumb screws, and funnel)
- 10 feet of ¾-inch drain tubing with hose clamp
- 10 feet of ½-inch OD Tubing
- CL17 Reagent Set, Free Chlorine or Total Chlorine
- Conductivity reference solution, 100 µS/cm
- StablCAL 20 NTU, 1 liter
- Calibration cylinder for the 1720E
- Sulfuric acid, 19.2 N, 100 mL MBD (for CL17 cleaning)
- Buffer, pH 4.01, 500 mL
- Buffer, pH 7.0, 500 mL
- Buffer, pH 10.01, 500 mL
- Beaker, 100 mL

Optional Accessories

- Fiberglass enclosure
- TOC Analyzer
- Autosampler
- Event Monitor
- ORP accessory package

Note: *Place sensors in the sensor manifold before removing the panel from the box to prevent probe damage. The conductivity probe (L shaped) is placed in the lowest opening.*

Section 3 Panel installation

3.1 Mechanical installation

DANGER
The WDMP sc is not suitable for installation in hazardous locations.

CAUTION
The WDMP sc weighs approximately 29.5 kg (65 lb). Do not attempt to unpack, carry or move without proper equipment and sufficient people to do so safely. Always use safe lifting technique: Lift with the legs, not with the back. Individuals with a history of back problems or cardiovascular problems should not attempt to unpack or lift the WDMP sc.

Important Note: *Install the pH and conductivity probes in the sensor manifold to prevent probe damage during installation. See Figure 1 on page 10 for probe placement.*

This manual contains a schematic-style flow and electrical hookup diagram to provide installation and maintenance information (Figure 9 on page 23). Figure 4 on page 16 displays hard-wiring and local disconnect details.

The panel is shipped assembled, plumbed and wired for hard-wire power connection. To install the panel:

1. Select the sampling point. The panel requires an incoming pressure of 20 to 125 psi.
2. Obtain appropriate mounting hardware for the installation. Mark positions for four fasteners according to the dimensions presented in Figure 2 on page 14.
3. Fasten the panel to the wall; ensure the hardware and connections can support 116 kg (256 lb) and that the panel unit is installed level.
4. Attach a ¾-inch ID (2-cm) drain hose, see Figure 2 on page 14.
5. Connect the sample to the sample inlet using the supplied ½-inch OD tubing.

Important Note: *Do not supply sample to the panel until the pH and chlorine analyzers have been set up (Section 4 on page 17).*

Important Note: *When plumbing for sample, provide a way to access fresh sample for rinsing probes and beakers during routine panel maintenance.*

3.1.1 Wall mount

DANGER
The WDMP sc must be securely fastened to a wall to ensure the panel does not cause bodily injury to the user. Failure to mount the system in a suitable location could cause the unit to become a hazard to personnel and equipment.

The panel must be securely mounted to a structure that will hold a weight equal to four times the weight of the entire unit. The enclosure must have complete vertical and lateral support.

Make sure the area where the system will be installed has sufficient clearance for the tray arms in the open position and installation of conduit and cable connections. Make sure all necessary entry holes are prepared before mounting the instrument. To ensure adequate ventilation for cooling, a minimum space of 12 inches should be maintained on all sides (front, top, sides and bottom).

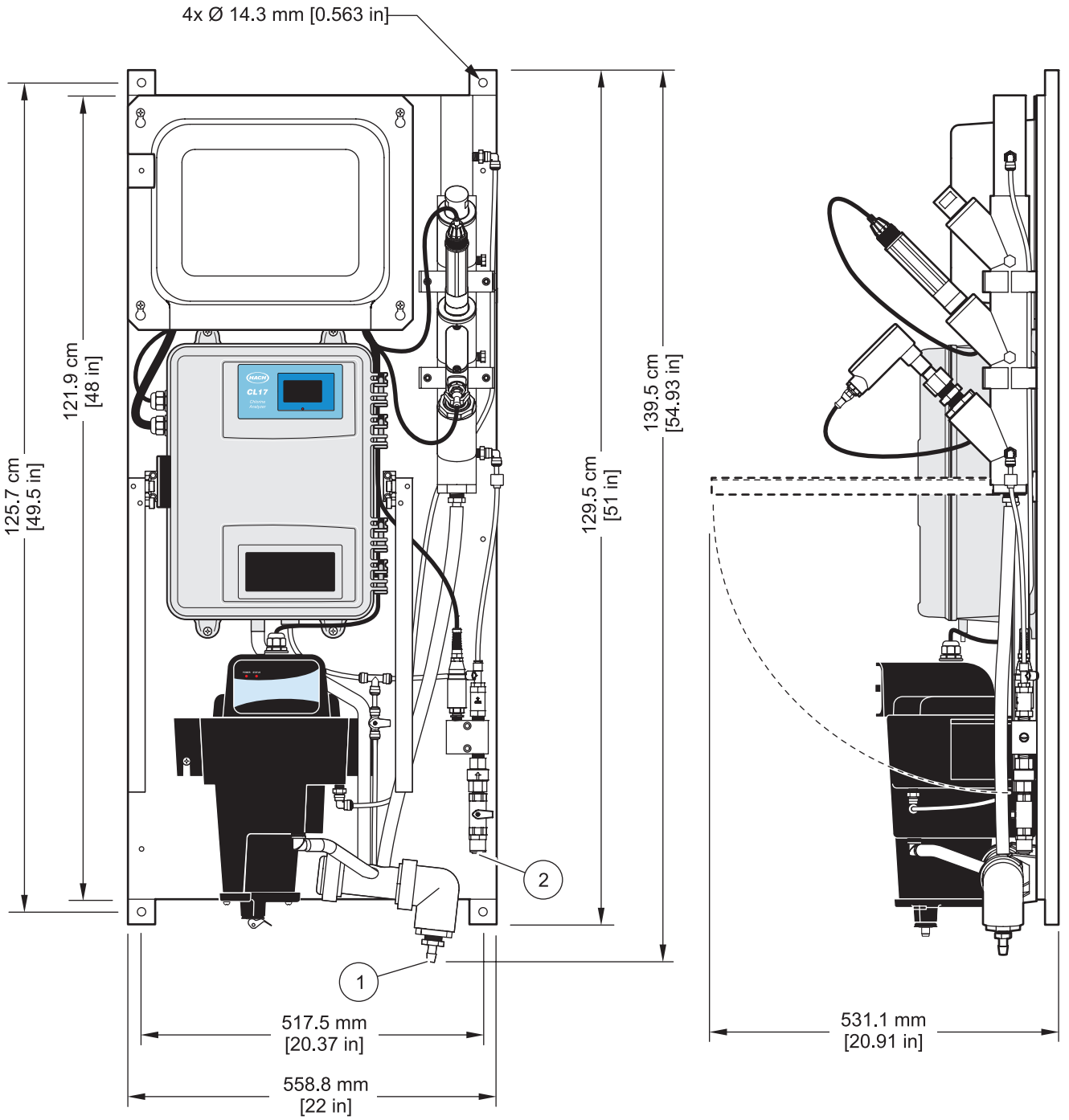


Figure 2 Installation dimensions

1	Hose barb or ¾-in. NPT	**2**	½-in. OD tubing quick-connect fitting

3.2 Hard-wiring power to the panel

DANGER
The panel must be securely fastened to a wall to ensure the panel does not cause bodily injury to the user. Failure to mount the system in a suitable location could cause the unit to become a hazard to personnel and equipment.

DANGER
Do not attempt to wire the panel while circuits are live.

Use customer-supplied conduit fittings for hard-wiring power to the instrument (Figure 4). To ensure the proper sealing of the enclosure, make sure to select the style of conduit hardware that will seal to the junction box wall when using flexible or rigid conduit.

1. Attach a conduit fitting to the power opening on the junction box (Figure 4), and route the AC power wires through this opening.
2. A local disconnect switch or circuit breaker with sufficient current capacity for the panel and that breaks all mains powered (hot) conductors is required as shown in Figure 4 on page 16. It must be identified (marked) as the disconnect for the panel. The branch circuit breaker size for 100–115V mains circuits should not exceed 20A. For 230V the branch circuit breaker size should not exceed 10A.
3. Wire to meet local wiring codes. Wire insulation must be rated for at least 300 V, 80 ºC (Table 1 and Figure 4). Prepare the wires as shown in Figure 3.
4. Connect an uninterrupted green or green-yellow 18-14 AWG ground wire to the ground stud (labeled with the protective earth ground symbol, Figure 4).

Important Note: *The ground conductor wire gauge must be equivalent to that of the AC line (hot and neutral) conductor wires.*

5. Connect the 18-14 AWG mains conductors to the mains power terminal block inside the enclosure. Connect the Hot and Neutral wires to the appropriately marked screw terminal. Do not leave any bare wire exposed. (See Figure 4).

Important Note: *Although power selection is automatic for the panel and the sc1000 Controller, it is not automatic for the CL17. The CL17 is factory set for 100–115V. For 230V operation, the CL17 must be manually switched to 230V. Failure to properly set the CL17 voltage can result in malfunction or even damage to the CL17. Refer to the CL17 manual for instructions on how to properly set the mains voltage power.*

Table 1 Wiring color code

Terminal description	Wire color code for North America
Hot (L1)	Black
Neutral (N)	White
Ground	Green

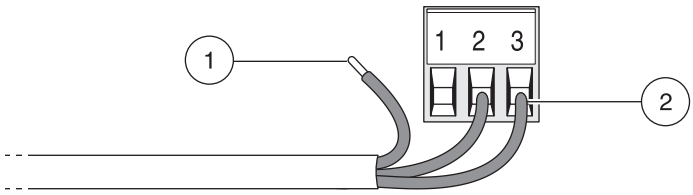


Figure 3 Example of proper wire preparation and insertion[1]

1	Strip ¼ in. of insulation	**2**	Seat insulation against connector with no bare wire exposed

[1] For wire preparation example only. See Figure 4 for exact wiring instructions for the WDMP sc.

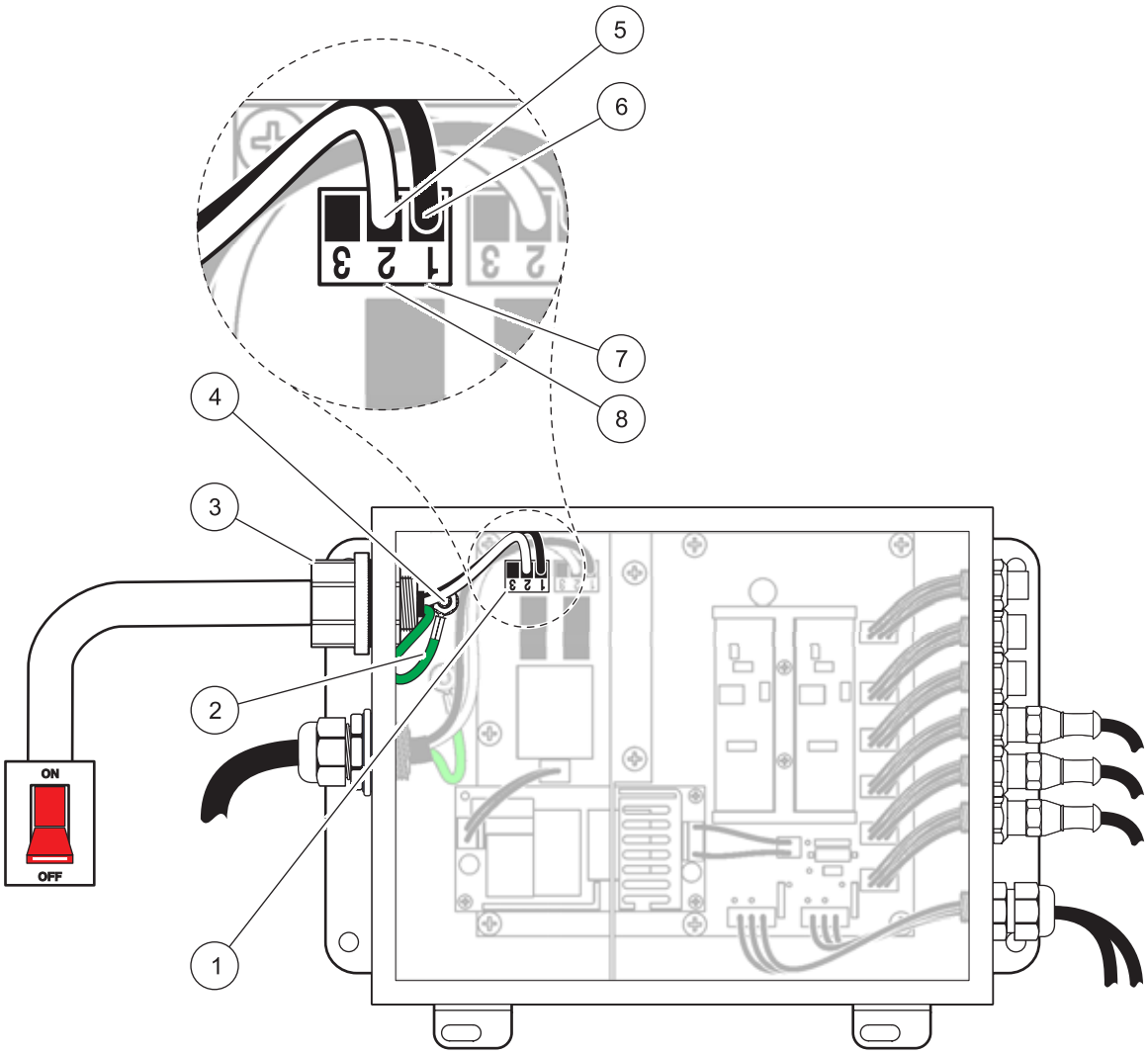


Figure 4 Local disconnect and hard-wiring for line power

1	AC power connector	**5**	Neutral wire (white)
2	Ground wire (green)	**6**	Hot wire (black)
3	½-in. NPT conduit hub with o-ring seal	**7**	Hot (L1)
4	Ground stud	**8**	Neutral (N)

Section 4 Panel startup

4.1 Startup

4.1.1 Unpacking the WDMP sc

Before removing the panel from the shipping carton, install the probes into the probe manifold to prevent probe damage. Refer to Figure 1 on page 10 and the following instructions:

1. Insert the L-shaped conductivity probe into the bottom probe holder on the probe manifold (item 5).
2. Insert the pH probe in the probe holder above the conductivity probe (item 4).
3. Insert additional probes into the top probe holder. If no additional probes will be used, insert the supplied plug into the top probe holder (item 3).

4.1.2 Mounting and installing the WDMP sc

1. Select the sampling point and install the panel (section 3.1 on page 13).

   Note: *The WDMP sc can be mounted to an optional panel rack (Cat. No. 6846800). The sc1000 controller can be mounted to the optional panel rack with the sc1000 mounting plate (Cat. No. 6846700).*

2. Hard-wire the panel to AC power (section 3.2 on page 15).
3. Hard-wire the sc1000 (section 3.1 through 3.3 of the sc1000 manual) to AC power and connect the controller data cable to the junction box on the panel.
4. Orient the drain manifold so the outlet drains down. Connect the three drain tubes. **Do not supply water to the panel.** Make sure the sample flowing into the WDMP sc has pressure greater than 20 psi. For sample pressure greater than the maximum specified pressure (125 psi), use the optional pressure regulator (Cat. No. 6846600) to bring the sample pressure back to an acceptable range for the WDMP sc panel.
5. Connect the conductivity probe to the junction box with the cable provided.
6. Apply power to the WDMP sc and the sc1000 controller (section 3.4 of the sc1000 user manual). The sc1000 controller will search for the devices.
7. Access the menu on the controller by pressing the touchscreen interface. Press the menu key (Figure 5) to access the display and set-up options on the controller. Set the time and date on the sc1000 controller. The controller may reboot. Refer to the sc1000 user manual for detailed information about data logging. The sc1000 will hold approximately 26 days of data with all six parameters logging once a minute. See section 5.1.7 of the sc1000 user manual for details about display settings.



Figure 5 sc1000 menu icon

8. Prepare the probes for operation:
   a. Remove the pH probe from its secured position and remove the plastic cap from the end of the probe. Ensure the O-ring is in place on the adapter fitting. Return the probe to the manifold.
   b. Configure each probe with the sc1000. Refer to the digital probe manual provided with each probe for configuration instructions.
9. Use the calibration solutions, calibration cylinder and beaker provided to calibrate the 1720E turbidity sensor and the pH and conductivity probes (refer to the probe manuals for specific calibration instructions). Figure 6 shows the sc1000 controller calibration menu options for the pH probe.
10. Prepare the CL17 for operation:
    a. Prepare and install the reagents (Figure 7), stir magnet, and pinch plate. See the CL17 User Manual for detailed instructions.
    b. Prime the CL17 Chlorine Analyzer reagents according to the instructions in the CL17 User Manual.
11. Supply water to the panel by opening the valve on the lower right corner.
12. Allow a minimum of two hours for instrument stabilization.

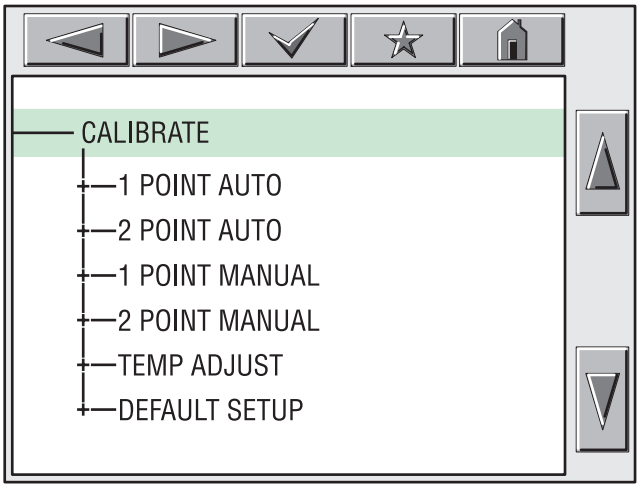


Figure 6 sc1000 controller—pH probe calibration screen

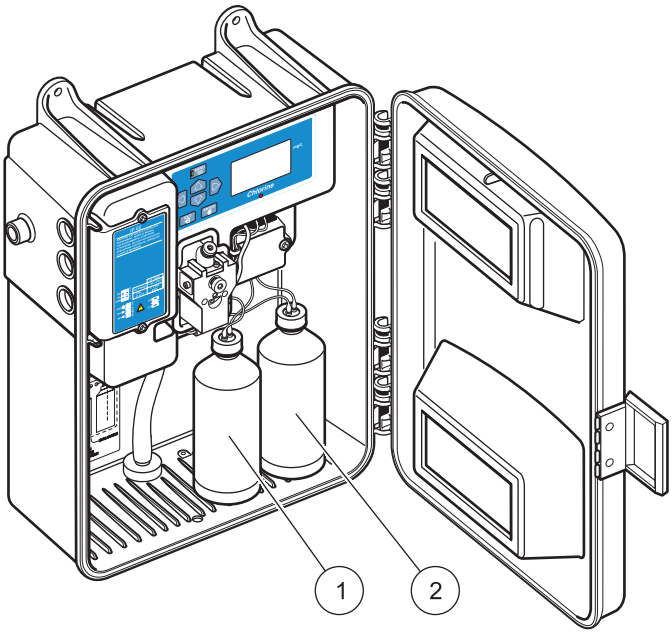


Figure 7 CL17 reagent location

1	Buffer solution	**2**	Indicator solution

Section 5 Maintenance

5.1 Scheduled maintenance

Perform the tasks identified in Table 2 at the recommended frequency to maintain the equipment in optimum condition. Refer to specific user manuals supplied with panel components for detailed instructions.

Table 2 Maintenance schedule

Activity	Frequency	Description
WDMP sc panel		
Maintenance	3 months	Clean (section 5.2)
		Check for leaks: Tubing ¼-inch black and ½-inch drain Flow controller O-ring for seal on probes Fittings, elbows and couplers
1720E		
Verification	30 days	Refer to the 1720E User Manual (Verification requires the ICEPIC accessory, not included with the WDMP sc.)
Calibration	3 months	Refer to the 1720E User Manual
Maintenance	30 days	Clean (refer to User Manual)
CL17		
Verification	6 months	Verify by comparing sample results to a laboratory photometer
Maintenance	30 days	Check and change reagents: Free Chlorine; Total Chlorine
		Check for leaks
		Clean sample cell
		Clean sample block
	6 months	Change pump tubing
	1 year	Change all other tubing
Probe (Conductivity and pH)		
Verification	30 days	Insert probe into a known standard
Calibration	3 months	Refer to User Manual
Maintenance	30 days	Clean (refer to User Manual)

5.2 Cleaning the panel

Note: *Refer to Figure 9 on page 23 to service the panel, close valve #12 and to open valve #17 to drain the sensor manifold.*

Use a mild detergent to wash the surface of the WDMP sc, then rinse with minimal pressure. Avoid the use of solvents. Do not rinse with a pressurized hose.

5.3 Using the signal junction box cover/tray for component calibration

The WDMP sc signal junction box cover/tray is designed to double as a table for holding standards and reagents used during calibration of panel components. Refer to the component user manual for specific calibration instructions.

Slide the signal junction box cover/tray up and place the cover/tray on the arms (Figure 8 on page 22).

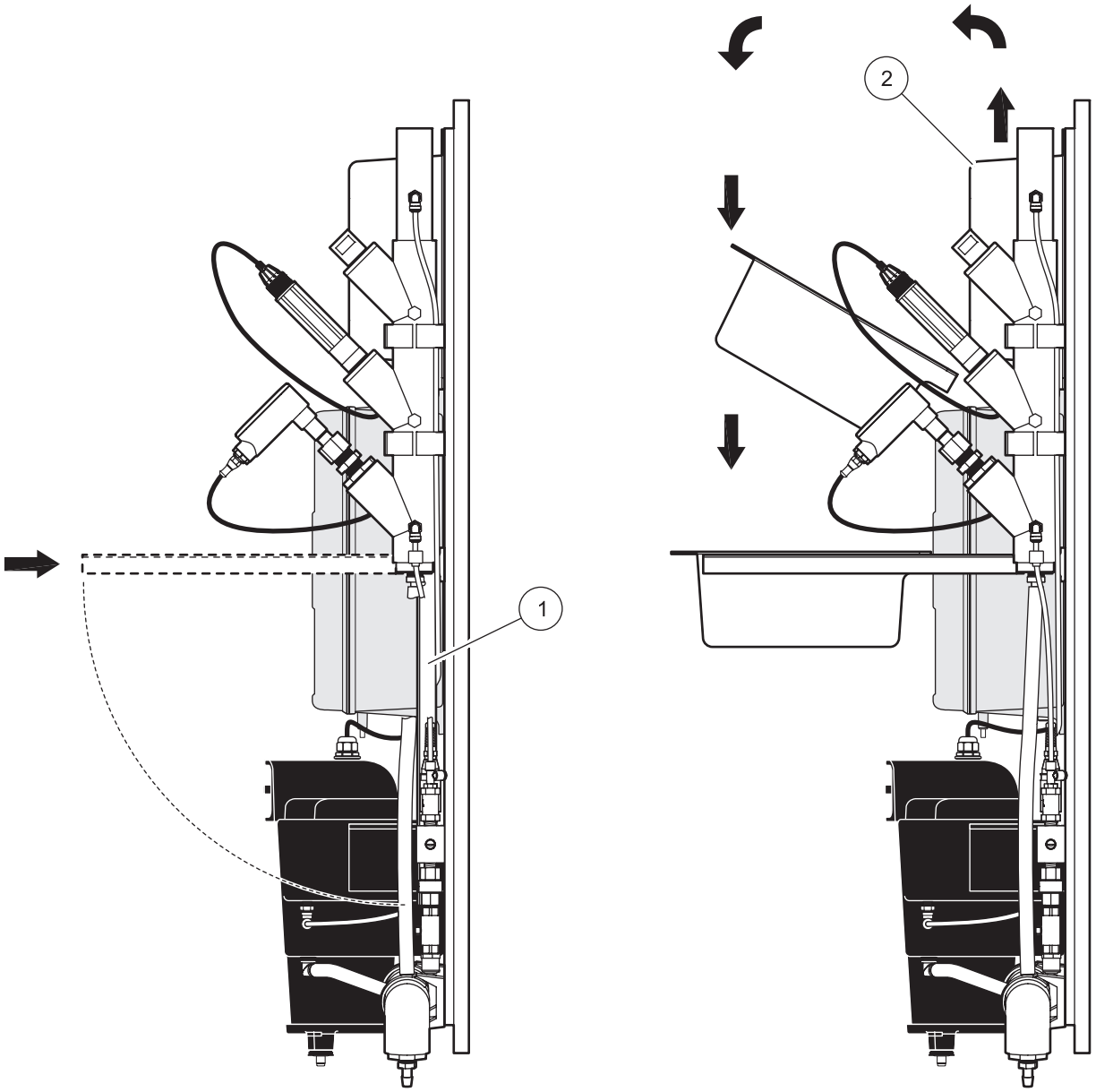


Figure 8 Cover to tray conversion

1	Tray arm (2x)	**2**	Cover/tray

5.4 Wiring connections for component replacement

DANGER
Disconnect power to the WDMP sc before performing all electrical work.

The WDMP sc is supplied with a junction box for wiring connections. The junction box is shielded by a cover that doubles as a tray for calibration standards and reagents. The cover is removed by sliding it up then pulling it away from the panel. Wiring connections are shown in Figure 9 and Figure 10. To access the wiring connections inside the junction box, remove the two screws and open the hinged cover.

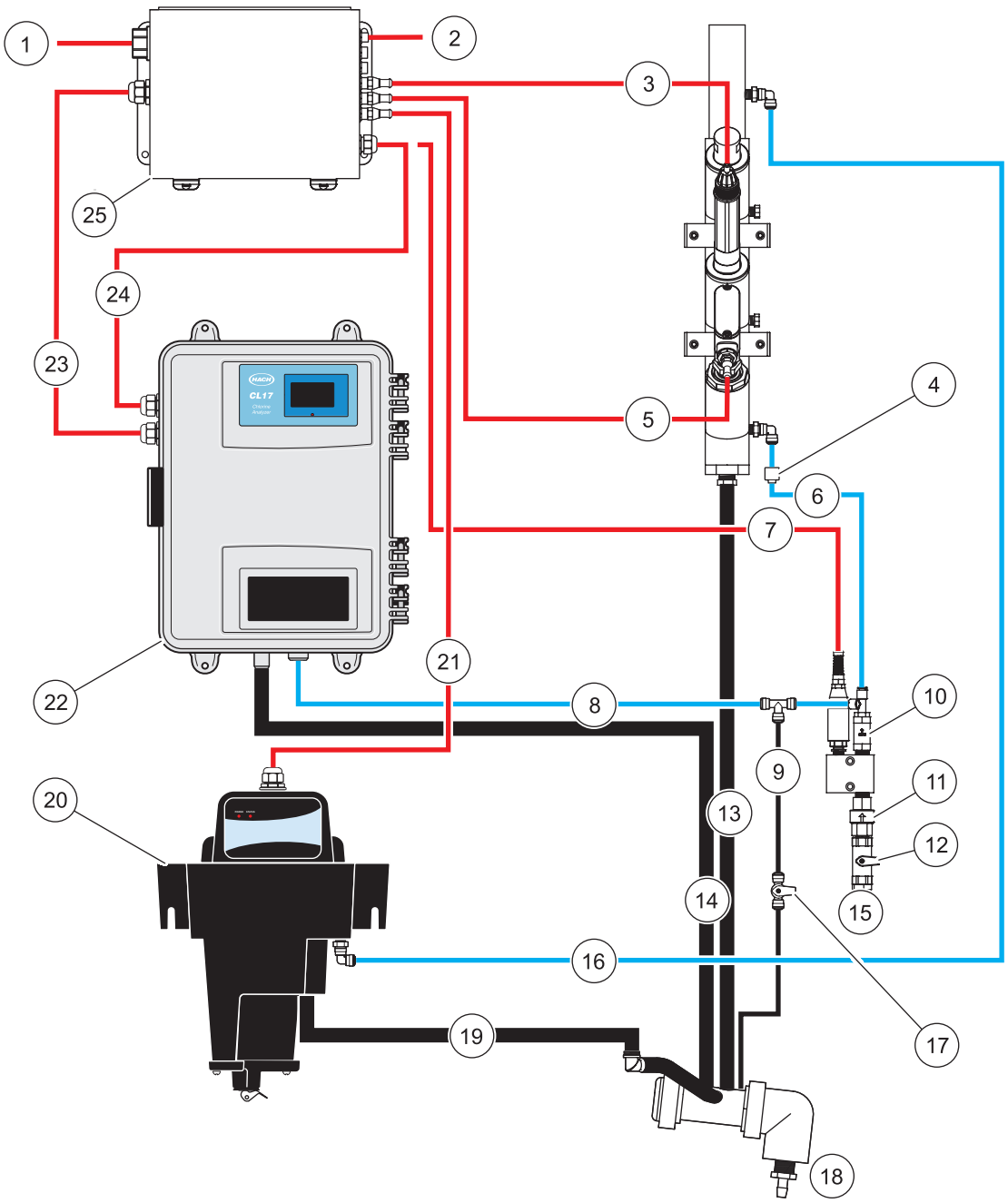


Figure 9 Fluid Flow and Electrical Diagram

1	AC power in	**10**	Flow regulator	**19**	1720E drain
2	To sc1000	**11**	One-way flow valve	**20**	1720E
3	pH probe	**12**	Shut-off valve	**21**	Digital signal from 1720E
4	Flow-restrictor assembly	**13**	Manifold drain	**22**	CL17
5	Conductivity probe	**14**	CL17 drain	**23**	AC power to CL17
6	Sample to manifold	**15**	Sample in	**24**	Analog signal from CL17
7	Gems Pressure Sensor	**16**	Sample to 1720E	**25**	Signal junction box
8	Sample to CL17	**17**	Shut-off valve		
9	Manifold drain	**18**	To drain		

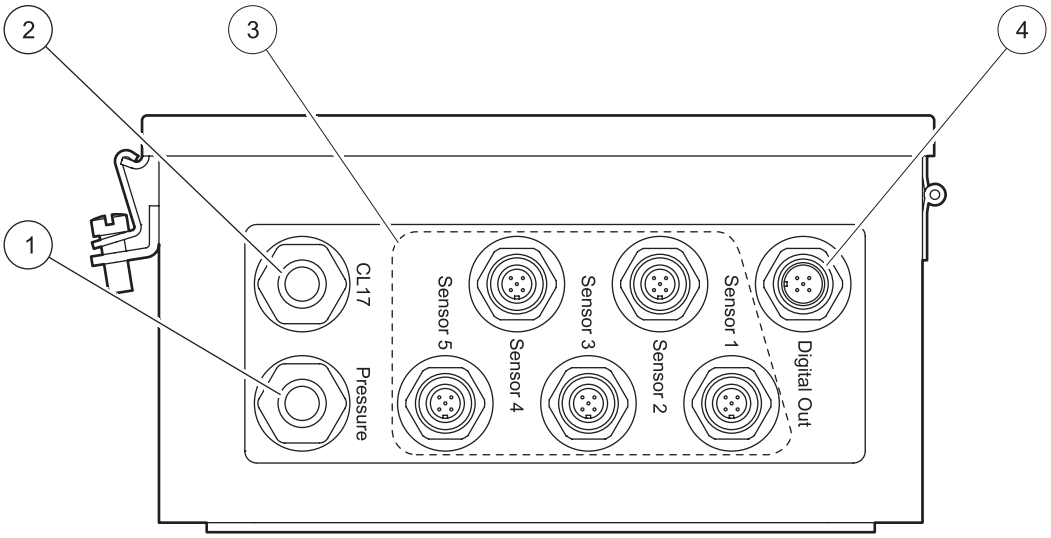


Figure 10 Junction box instrument connections

1	4–20mA Gems pressure sensor connector	**3**	Digital instrument connections
2	4–20mA CL17 connector	**4**	To sc1000

5.5 Fuse replacement

DANGER
Remove power from the panel when removing or installing a fuse.

DANGER
For continued protection against fire hazard, replace the fuse only with a fuse of the same type and rating.

Important Note: *Failed fuses are an indication that an equipment problem may exist. Problem resolution and fuse replacement should be performed only by qualified service personnel.*

The power section of the signal junction box contains two fuses. Refer to Figure 11 and the following steps to replace the fuses:

1. Disconnect power to the WDMP sc.
2. Remove the signal junction box cover/tray by sliding it up, then lifting it away from the panel.
3. Remove the two screws securing the hinged junction box cover, then raise the hinged cover until it rests in an open position.
4. Remove the failed fuses and install new fuses of the same type and rating (T, 1A, 250V).
5. Close the junction box cover and secure the two screws. Replace the signal junction box cover/tray.
6. Connect power to the instrument.

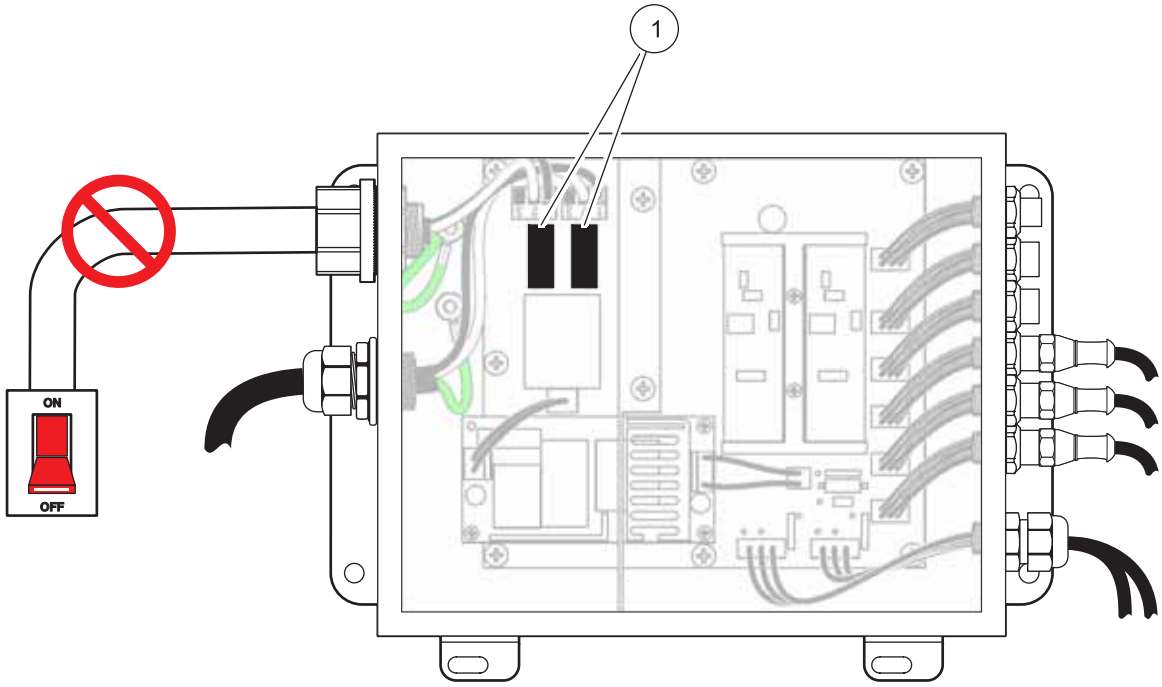


Figure 11 Fuse replacement

1	Fuse, T, 2 A, 250 V (2x)

Section 6 Troubleshooting

6.1 Troubleshooting the CL17 Chlorine Analyzer

DANGER
The CL17 derives power from the WDMP sc power/signal junction box. To remove power from the CL17, disconnect the external power to the WDMP sc power/signal junction box.

Table 3 supplies troubleshooting information for the CL17. After determining the symptom and probable cause, perform the corrective action steps in the order given.

Table 3 Troubleshooting guide

Symptom	Probable cause	Corrective action
Display does not light and the pump motor is not operating	No operating power	Check power switch position, fuses and power cord connections
Display does not light and the pump motor operates	Problem with power supply	Replace the main circuit board
Display lights and the pump motor does not operate	Low operating power	Verify the line voltage is within specifications
	Incorrect line voltage selector switch setting	Check the line voltage selector switch position
	Motor cable not connected to the circuit board	Check the motor cable connection
	Defective motor	Replace motor
Zero reading	No stir bar	Place the stir bar into the colorimeter. (Refer to the CL17 Instrument Manual.)
	Pinch plate thumb screws are not fully tightened	Tighten the thumb screws
	Sample is not flowing to the instrument	Check the sample conditioning and other sample supply lines
	More than one stir bar	Remove the plug from the top of the colorimeter and use a flashlight to illuminate the inside of the cell. Look into the colorimeter to determine if more than one stir bar is inside. Remove excess stir bars.
	Incorrect flow rate or sample pressure	Verify flow rate and sample pressure
Sample is overflowing from the colorimeter	Drain line clogged or air lock in drain line	Clean drain line and/or eliminate air lock from drain plumbing
Excessive moisture is condensing on the colorimeter	Temperature differential between sample and analyzer environment is too large	When practical, allow the sample temperature to warm to room temperature before it enters the analyzer
Low reading	Clogged tubing	Replace tubing
	Incorrect flow rate or sample pressure	Verify flow rate and sample pressure

6.2 Troubleshooting the 1720E

Table 4 describes sensor warnings displayed in the Alarm Log, their possible causes and corrective actions.

Table 4 1720E diagnostics

Sensor warning	Possible cause	Corrective action
Bad lamp	Lamp burned out	Replace the lamp. Refer to the 1720E user manual.
	Lamp unplugged	Restore connection
	Disconnection at power supply	Restore connection
	Dislodged lamp	Reinstall lamp
	Bad circuit board in turbidimeter head	Contact the Service Department
Low signal	Photocell coated/dirty	See Cleaning the Photocell Window in the 1720E manual. Contact the Service Department.
	Photocell wires disconnected	Reconnect wires
	Photocell broken/cracked	Replace photocell Contact the Service Department
	Lens coated/dirty	Clean the lens using isopropyl alcohol and a cotton swab
	Obstructed light path	Remove obstruction
	Sample turbidity >100 NTU	Switch to a high range turbidimeter
	See bad lamp causes above	See bad lamp corrective actions above
Bad system voltage	Turbidimeter head cable greater than 31 feet	Contact the Service Department
	Fluctuation in power supply voltage	Turn power off and back on to the instrument
	Bad circuit board in turbidimeter head	Contact the Service Department
A/D converter timeout	Fluctuation in power supply voltage	Turn power off and back on to the instrument
	Bad circuit board in turbidimeter head	Contact the Service Department
High dark counts	Light leak—Turbidimeter head not on turbidimeter body or calibration cylinder during Power Up or Zero Electronics	Make sure the turbidimeter head is on the turbidimeter body and properly aligned and repower instrument or perform ZERO ELECTRONICS in the CALIBRATION MENU.
	Light leak—Turbidimeter head not properly aligned on the turbidimeter body or calibration cylinder during Power Up or Zero Electronics	Make sure the turbidimeter head is properly aligned and repower instrument or perform ZERO ELECTRONICS in the CALIBRATION MENU.
	Photocell broken/cracked	Replace photocell

6.3 Troubleshooting the pH/ORP Sensor

6.3.1 Ground loops

The analyzer may be affected by a ground loop problem (two or more electrically grounded points at different potentials).

Symptoms indicating a possible ground loop

- Analyzer reading is offset from the actual value by a consistent amount
- Analyzer reading is frozen on one value
- Analyzer reading is off scale (upscale or downscale)

Although the source of a ground loop may be difficult to determine, there are several common causes.

Common causes of ground loops

- Components, such as recorders or computers, are connected to non-isolated analog outputs.
- Not using shielded cabling or failure to properly connect all cable shields.
- Moisture or corrosion in a junction box.

The following simple test can help to determine if there is a ground loop:

1. With the pH measurement displayed, put the sensor in a non-conductive container (plastic or glass) filled with a known value pH buffer. Note the analyzer reading for this solution.
2. Connect one end of a wire to a known earth ground, such as the green analyzer ground screw or a metal water pipe. Place the other end of this wire into the buffer next to the sensor.
3. Note the analyzer reading now and compare it with the reading taken in step 1. If the reading changed, a ground loop exists.

Finding the source of a ground loop

- Isolating measuring system problem
- Checking electrical connections
- Verifying sensor operation
- Verifying analyzer operation

Troubleshooting tip—Use a systematic troubleshooting method. If possible, start by grounding all shields and electrical grounds at one stable point. One at a time, turn off all pumps, motors and switches that are in contact with the process. Each time you do this, check if the ground loop still exists. Since the process media being measured is electrically conductive, the source of the ground loop may not be readily apparent.

To verify sensor operation, refer to the procedure in the troubleshooting section of the sensor operating manual.

6.4 Troubleshooting the conductivity sensor

6.4.1 Ground loops

Refer to section 6.3.1 on page 29.

6.4.2 Isolating measuring system problem

- Verifying sensor operation
- Verifying analyzer operation

DANGER
Disconnect line power to the WDMP sc to avoid the possibility of electrical shock.

When experiencing problems, try to determine the primary measurement system component causing the problem (sensor, analyzer or interconnect cable, if used).

Remove power to the WDMP sc and check all analyzer cable connections to ensure proper connections.

6.4.3 Verifying interconnect cable integrity

DANGER
Disconnect line power to the WDMP sc to avoid the possibility of electrical shock.

1. After disconnecting line power to the WDMP sc and the simulation resistors (or decade box), reconnect the sensor directly to the analyzer (purposely bypassing the interconnect cable and junction box, if used).

2. Place the sensor in a container of conductivity reference olution of known value at room temperature approximately 25 °C).

3. Reconnect line power to the Water Distribution Monitoring Panel.

4. Verify that the analyzer reading is the same as the known reference solution value. If the reading is achieved, the interconnect cable and/or junction box connections are probably faulty. Use a digital multimeter to check the interconnect cable for shorted or open wires.

Section 7 Replacement parts and accessories

7.1 Replacement parts

Description	Cat. No.
Conductivity Sensor	D3422C3
Gems Pressure Sensor	6842600
Fuse, for power supply module (T, 1A, 250V)	6847900
Hach CL17 Chlorine Analyzer	5440260
Hach 1720E Low Range Turbidimeter	6010160
O-ring	6849000
pH Sensor	DPD1R1-WDMP
Universal Gateway, WDMP sc	6186201

7.2 WDMP sc accessories

Description	Cat. No.
Binder with manuals for each instrument	6846018
CL17, start-up kit, includes:	
maintenance kit	5444300
Torx wrench	5467000
Stir bar	5412900
pressure plate	5411800
two thumb screws	5410100
funnel	4431200
Field Service Partnership for WDMP sc:	FSPWDMP
One-year extended warranty	—
Two-year extended warranty	—
Three-year extended warranty	—
Free Standing Rack, wheeled	6846800
ORP Sensor Accessory Package	6846400
Plate, sc1000 controller, for attachment to free-standing wheeled rack	6846700
Pressure Regulator Accessory Package (to bring sample pressure into the specified range)	6846600
TOC analyzer, WDM astroTOC UV analyzer, CRS, 25 mg/L w/SIM	H-6195-1030DS
WDMP sc Manual	DOC026.53.00773
WDMP sc in a Nema 4X Enclosure	6846100
WDMP sc Maintenance Kit (CL17 reagent ordered separately)	6846300
WDMP sc Start-up Kit	6846200

7.2 WDMP sc accessories (continued)

Description	Cat. No.
Additional Instruments	
Event Monitor Trigger System	6950000
900 Max Autosampler, portable	007182
900 Max Autosampler, refrigerated	007183
900 Max All-Weather Autosampler, refrigerated	007184
TOC analyzer, WDM astroTOC UV analyzer, CRS enclosure, 25 mg/L w/SIM (recommended version)	H-6195-1030DS
TOC analyzer, WDM astroTOC UV analyzer, CRS enclosure, 0–5 mg/L	H-6195-1010DS
TOC analyzer, WDM astroTOC UV analyzer, CRS enclosure, 0–10 mg/L	H-6195-1020DS
TOC analyzer, WDM astroTOC UV analyzer, CRS enclosure, 0–50 mg/L	H-6195-1040DS
Purge Gas Generator for TOC Analyzer	4300-0006

7.3 WDMP sc pH reagents

Description	Cat. No.
Buffer, pH 4, 500 mL	2283449
Buffer, pH 7, 500 mL	2283549
Buffer, pH 10, 500 mL	2283649
Replacement Viton O-ring	5H1304
Salt Bridge	SB-R1SV
Standard Solution	25M1A1025-115

7.4 WDMP sc ORP reagents

Description	Cat. No.
Buffer, 200 mV, 500 mL	25M2A1001-115
Buffer, 600 mV, 500 mL	25M2A1002-115
O-ring, Viton, replacement	5H1304
Salt Bridge	SB-R1SV
Standard Solution	25M1A1025-115

7.5 Calibration standards for conductivity

Description	Cat. No.
100-1000 µS/cm, 1 liter	25M3A2000-119
1000 µS/cm, 100 mL	14400-42
1000-2000 µS/cm, 1 liter	25M3A2050-119

7.6 Turbidimeter standards

Description	Cat. No.
1720E Calibration Standard, StablCAL 20 NTU, 1 L	2660153
Calibration Cylinder	4415300
ICE-PIC Module, 20 NTU for calibration and calibration verification	5225000
ICE-PIC Module, 1 NTU for calibration and calibration verification	5221500
ICE-PIC Module, 0.5 NTU for calibration and calibration verification	5222500
StablCal Calibration Kit	2659600
StablCal Calibration Standard, 1 NTU, 1 L	2659853
StablCal Calibration Standard, 20 NTU, 1 L	2660153
StablCal Calibration Standard, 40 NTU, 1 L	2746353
StablCal Low Range Verification Kit	2716300

7.7 Chlorine reagent sets

Description	Cat. No.
CL17 Maintenance Kit	5444300
CL17 Reagent Set, Chlorine Free	2556900
CL17 Reagent Set, Chlorine Total	2557000
Sulfuric acid, 19.2 N 100 mL MDB, for CL17 cleaning	203832

7.8 TOC accessories[1]

Description	Cat. No.
Purge Gas Generator with 115V Compressor	4300-0006
TOC Standard, 25.0 mg/L, 4 liters	5846300
Sodium Persulfate (0.6 M), 20 L (three-month supply)	5845300
Phosphoric Acid (0.6 M), 20 L (one-month supply)	5846000
Zero Standard Solution, 4 L (three-month supply)	5847700

[1] Reagents listed are for the 0–25 mg/L TOC analyzer. Analyzers with different ranges will require a different set of reagents. Refer to the TOC user manual for specific reagent requirements.

Section 8 How to order

U.S.A. customers

By telephone:

6:30 a.m. to 5:00 p.m. MST

Monday through Friday

(800) 604-3493

By fax:

(970) 669-2932

By mail:

Hach Company Homeland Security Technologies

P.O. Box 389

Loveland, Colorado 80539-0389 U.S.A.

Ordering information by e-mail: orders@hach.com

Information required

- Hach account number (if available)
- Your name and phone number
- Purchase order number
- Brief description or model number
- Billing address
- Shipping address
- Catalog number
- Quantity

International customers

Hach maintains a worldwide network of dealers and distributors. To locate the representative nearest you, send e-mail to intl@hach.com or contact:

Hach Company World Headquarters; Loveland, Colorado, U.S.A. Telephone: (970) 669-3050; Fax: (970) 669-2932

Technical and customer service (U.S.A. only)

Hach Technical and Customer Service Department personnel are eager to answer questions about our products and their use. Specialists in analytical methods, they are happy to put their talents to work for you.

Call 1-800-227-4224 or e-mail techhelp@hach.com

Section 9 Repair service

Authorization must be obtained from Hach Company before sending any items for repair. Please contact the Hach Service Center serving your location.

In the United States:
Visit www.hach.com to contact service personnel for your area.

In Canada:
Hach Sales & Service Canada Ltd.

1313 Border Street, Unit 34
Winnipeg, Manitoba
R3H 0X4
(800) 665-7635 (Canada only)

Telephone: (204) 632-5598

FAX: (204) 694-5134

E-mail: canada@hach.com

In Latin America, the Caribbean, the Far East, the Indian Subcontinent, Africa, Europe, or the Middle East:

Hach Company World Headquarters,
P.O. Box 389
Loveland, Colorado, 80539-0389 U.S.A.

Telephone: (970) 669-3050

FAX: (970) 669-2932

E-mail: intl@hach.com

Section 10 Limited warranty

Hach Company warrants its products to the original purchaser against any defects that are due to faulty material or workmanship for a period of *one year* from date of shipment unless otherwise noted in the product manual.

In the event that a defect is discovered during the warranty period, Hach Company agrees that, at its option, it will repair or replace the defective product or refund the purchase price, subject to the pro-rated schedule above, excluding original shipping and handling charges. Any product repaired or replaced under this warranty will be warranted only for the remainder of the original product warranty period.

This warranty does not apply to consumable products such as chemical reagents; or consumable components of a product, such as, but not limited to, lamps and tubing.

Contact Hach Company or your distributor to initiate warranty support. Products may not be returned without authorization from Hach Company.

Limitations

This warranty does not cover:

- Damage caused by acts of God, natural disaster, labor unrest, acts of war (declared or undeclared), terrorism, civil strife or acts of any governmental jurisdiction
- Damage caused by misuse, neglect, accident or improper application or installation
- Damage caused by any repair or attempted repair not authorized by Hach Company
- Any product not used in accordance with the instructions furnished by Hach Company
- Freight charges to return merchandise to Hach Company
- Freight charges on expedited or express shipment of warranted parts or product
- Travel fees associated with on-site warranty repair

This warranty contains the sole express warranty made by Hach Company in connection with its products. All implied warranties, including without limitation, the warranties of merchantability and fitness for a particular purpose, are expressly disclaimed.

Some states within the United States do not allow the disclaimer of implied warranties and if this is true in your state the above limitation may not apply to you. This warranty gives you specific rights, and you may also have other rights that vary from state to state.

This warranty constitutes the final, complete, and exclusive statement of warranty terms and no person is authorized to make any other warranties or representations on behalf of Hach Company.

Limitation of remedies

The remedies of repair, replacement or refund of purchase price as stated above are the exclusive remedies for the breach of this warranty. On the basis of strict liability or under any other legal theory, in no event shall Hach Company be liable for any incidental or consequential damages of any kind for breach of warranty or negligence.

Section 11 Certification

Hach Co. certifies this instrument was tested thoroughly, inspected and found to meet its published specifications when it was shipped from the factory.

The **Water Distribution Monitor Panel sc (WDMP sc)** has been tested and is certified as indicated to the following instrumentation standards:

Product Safety

Listed to UL 61010-1 and Certified to CSA C22.2 No. 61010-1 by ETL (cETLus safety mark)

Certified by Hach Co. to EN 61010-1 Amds. 1 & 2 (IEC 61010-1) per 73/23/EEC, supporting test records by Intertek Testing Services.

Immunity

This equipment was tested for industrial level EMC per:

EN 61326 (EMC Requirements for Electrical Equipment for Measurement, Control and Laboratory Use) **per 89/336/EEC EMC:** Supporting test records by Hach Company, certified compliance by Hach Company.

Standards include:
IEC 1000-4-2:1995 (EN 61000-4-2:1995) Electrostatic Discharge Immunity (Criteria B)

IEC 1000-4-3:1995 (EN 61000-4-3:1996) Radiated RF Electromagnetic Field Immunity (Criteria A)

IEC 1000-4-4:1995 (EN 61000-4-4:1995) Electrical Fast Transients/Burst (Criteria B)

IEC 1000-4-5:1995 (EN 61000-4-5:1995) Surge (Criteria B)

IEC 1000-4-6:1996 (EN 61000-4-6:1996) Conducted Disturbances Induced by RFFields (Criteria A)

IEC 1000-4-11:1994 (EN 61000-4-11:1994) Voltage Dip/Short Interruptions (Criteria B)

Additional Immunity Standard/s include:
ENV 50204:1996 Radiated Electromagnetic Field from Digital Telephones (Criteria A)

Emissions

This equipment was tested for Radio Frequency Emissions as follows:

Per **89/336/EEC** EMC: **EN 61326:1998** (Electrical Equipment for measurement, control and laboratory use—EMC requirements) Class “A” emission limits. Certified compliance by Hach Company. Supporting test records by Hach Co. Loveland, Colorado Test Center.

Standards include:
EN 61000-3-2 Harmonic Disturbances Caused by Electrical Equipment

EN 61000-3-3 Voltage Fluctuation (Flicker) Disturbances Caused by Electrical Equipment

Additional Emissions Standard/s include:
EN 55011 (CISPR 11), Class “A” emission limits

Canadian Interference-causing Equipment Regulation, IECS-003, Class A

Certified compliance by Hach Company. Supporting test records by Hach Co. Loveland, Colorado Test Center.

This Class A digital apparatus meets all requirements of the Canadian Interference- Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

FCC PART 15, Class “A” Limits

Certified compliance by Hach Company. Supporting test records by Hach Co. Loveland, Colorado Test Center.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. The following techniques of reducing the interference problems are applied easily.

1. Disconnect the WDMP sc from the power source to verify that it is or is not the source of the interference.
2. If the WDMP sc is connected into the same outlet as the device with which it is interfering, try another outlet.
3. Move the WDMP sc away from the device receiving the interference.
4. Reposition the receiving antenna for the device receiving the interference.
5. Try combinations of the above.

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